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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/747,824	12/29/2003	Daniel C. Diana	INTEL16	6455
6980	7590	06/16/2005	EXAMINER	
TROUTMAN SANDERS LLP BANK OF AMERICA PLAZA, SUITE 5200 600 PEACHTREE STREET, NE ATLANTA, GA 30308-2216			DANG, TRUNG Q	
			ART UNIT	PAPER NUMBER
			2823	

DATE MAILED: 06/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/747,824

Applicant(s)

DIANA ET AL.

Examiner

Trung Dang

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 April 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-9 and 22-25 is/are allowed.
- 6) ☒ Claim(s) 10-15 and 18 is/are rejected.
- 7) ☒ Claim(s) 16-17, 19-21 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 13-15, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson et al. (US 2002/0197844) in view of Gudesen (US 2003/0107067).

The rejection is maintained as of record and repeated herein.

With reference to Figs. 9-10, Johnson teaches a ferroelectric die, comprising:

a silicon (Si) substrate 10;

an oxide thermal insulation layer 20 on top of the Si substrate;

a first metal layer 22, 28 on top of the oxide layer;

a ferroelectric layer 30' on top of the first metal layer (Fig. 9 and para.[0044]);

an interlevel dielectric (ILD) layer 36' on top of the ferroelectric layer;

a second metal layer 40 having on top of the ILD layer; and

a via metal 99 plug passing through the ILD layer and the ferroelectric layer to electrically connect the first metal layer 22, 28 to the second metal layer 40.

Note that the metal layer 99 is broadly interpreted as via metal plug because it is formed in the via.

Johnson differs from the claims in that while Johnson discloses layer 30' is of ferroelectric material, the claims call for a ferroelectric polymer.

Gudesen teaches the advantages of ferroelectric polymer materials, for example, their dielectric properties allow their function as electrically insulating barrier materials as well as the possibility of applying them in global layers of extreme thickness down to few nanometers (para. [0032]).

It would have been obvious to one of ordinary skill in the art to modify the teaching of Johnson by selecting the ferroelectric polymer material for the ferroelectric layer 30' as suggested by Gudesen because of the benefits mentioned above.

As for claims 14 and 15, Fig. 10 depicts metal layer 99 has a step and the portion adjacent to the step is below the surface of the ILD 36'.

As for claim 18, metal layer 99 has a portion that is coplanar with the IDL layer 36'.

### Allowable Subject Matter

2. Claims 16-17 and 19-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

3. Claims 1-9, 22-25 are allowed.

4. The following is an examiner's statement of reasons for allowance:

Independent claim 1 and its dependent claims are allowed over prior of record because the prior art of record does not teach or suggest the claimed step regarding an electroless plating process.

Independent claim 22 and its dependent claims are allowed over prior of record because the prior art of record does not teach or suggest the claimed structure regarding a plurality of metallization layers stacked on an oxide layer, wherein each metallization layer comprises elements as recited in the claim.

### ***Response to Arguments***

5. Applicant's arguments filed 4/7/05 have been fully considered but they are not persuasive.

At the bottom of page 8 of the Remarks, applicants argue that the copper diffusion barrier layer 99 do not provide an electrical contact between the thin metal layer and the copper plug. The Examiner disagrees. As shown in Fig. 10, because layers 22, 99 and 40 are made of metallic materials therefore the diffusion barrier layer 99 clearly provides electrical connection between copper plug 40 and metal layer 22. Applicants further stated that "the copper diffusion barrier layer is only part of the via plug". This is exactly what the Examiner interpreted metal layer 99 as via metal plug in

the rejection since the claim 13 does not specify the claimed via metal plug is a part or a whole of the plug. In page 9, applicants argue that Johnson does not include a second metal layer on the of the ILD layer but rather the second metal layer lies entirely within the trench or via. In response, it is noted that paragraph [0070] discloses that prior to the CMP process copper layer 40 lies outside the trench. Thus, the intermediate structure (i.e. before the CMP) copper layer 40 lies on top of the ILD layer 36, which rendering the claimed structure anticipated by the intermediate structure of Johnson.

### ***Conclusion***

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Trung Dang whose telephone number is 571-272-1857. The examiner can normally be reached on Mon-Friday 9:30am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Trung Dang  
Primary Examiner  
Art Unit 2823

6/12/05